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PSEUDOJULUS BOLLMAN, 1887, AND GEORGIULUS,  
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(JULIDA: PARAJULIDAE)

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ABSTRACT

The parajulid genus *Pseudojulus* (Bollman, 1887), heretofore of uncertain taxonomic position, is referred to the tribe Aniulini following study of material of its type species *P. obtectus* (Bollman). The closely related new genus *Georgiulus* is proposed to accommodate two new taxa: *G. paynei* (the type species) from southern Georgia, and *P. hubrichti* from northeastern Georgia. These two genera differ from other aniulines by the dramatic enlargement of the eighth sternum in males. The genitalia of all three species are illustrated, and the major elements of parajulid gonopods are discussed in general.

NARRATIVE

Of the 42 families of millipeds represented in the fauna of North America, the Xystodesmidae (order Polydesmida) and Parajulidae (order Julida) are by far the most dominant in terms of genera and species, and in many areas, it is the species of these two taxa that are most frequently collected. The families moreover share a characteristic distributional pattern (much of conterminous United States, Mesamerica south to Guatemala and Costa Rica, and parts of eastern Asia) and appear to have reached about the same stage of phylogenetic maturity.

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Although both include anatomically disjunct small or monotypic genera, the more usual condition reflects active speciation producing numerous localized forms without sharply defined anatomical discontinuities by which genera may be distinguished. Whereas the Xystodesmidae is becoming comprehensible through studies begun by me in 1956 and continued by R. M. Shelley since 1972, classification of the Parajulidae remains highly unsatisfactory. The family was studied by Nell B. Causey from 1948 to about 1974, during which time her colleagues furnished material and generally refrained from publishing on parajulids. However, since only a few brief papers appeared from Dr. Causey's hand prior to her demise in 1979, it is now necessary for the work to be commenced *de novo* — a task to which no current diplopodologist willingly aspires.

Although parajulids are of sufficient biological and evolutionary interest to merit a thorough familial revision, current realities guarantee that such an undertaking probably will not occur in this century. A compromise solution, entailing treatment of individual genera as time and material permit, carries the inherent liability that preliminary conclusions may be invalidated by subsequent studies, yet in the present situation, any progress seems preferable to none.

I commence here with the consideration of two closely related taxa which are of special interest. One carries the second oldest generic name in the family (*Pseudojulus* Bollman, 1887) and is thus a possible senior synonym to more recently proposed names, since the genitalic characters of the type species have never been recorded. The second, *Georgiulus*, contains two new species from Georgia, and represents a sister-group against which the characters of *Pseudojulus* may be contrasted.

Type material of the new species was donated by Drs. Jerry A. Payne and William A. Shear and Mr. Leslie Hubricht, and is deposited in the Virginia Museum of Natural History (VMNH). Access to typical and topotypical specimens of *P. obtectus* was provided by Dr. G. B. Edwards, Florida State Collection of Arthropods (FSCA), whose cooperation is much appreciated. Dr. Shear and Dr. Rowland M. Shelley provided a careful review of the manuscript in its penultimate draft.

## SYSTEMATIC TREATMENT

Family **Parajulidae** Bollman

Parajulinae Bollman, 1893, U. S. Nat. Mus. Bull. 46:156.

Paraiulidae Cook, 1895, Ann. New York Acad. Sci., v. 9, p. 6, *et auct. subs.*

Parajulidae Hoffman, 1980, Classification of the Diplopoda, p. 102.

At present, this almost exclusively Nearctic family contains 27 genera and about 125 nominal species. The numbers surely do not approximate reality, because even though a few of the generic names (and many of the specific) will be found redundant, their loss will be more than compensated by the discovery of new forms, especially in Mexico. Only eight generic names had been proposed prior to 1940, when R. V. Chamberlin set up 13 in one landmark paper; later, Chamberlin added three more names, and two each were contributed by Loomis and Causey. Chamberlin was quite correct in naming the many distinctive species groups even though one may deplore the way in which they were proposed: usually with only a very superficial reference to a single gonopodal "key character" and never with really adequate illustrations.

By 1948 the family had become both large and confused, with many of its earlier taxa still completely obscure. In that year, a detailed revisionary study was undertaken by Causey, who over the following decades amassed a large volume of material and studied virtually all existing type specimens. Regrettably the great investment of her time and efforts went for naught, as she was unable to complete the project. At least she prepared a summary of suprageneric taxa in the family, with observations on taxonomic characters and evolutionary trends (1974), to which the reader is referred as the only comprehensive account of the family. Although proposing and defining 11 new tribes, Dr. Causey neglected to list the genera referable to each, giving only the number of its included genera and species. It is uncertain whether only established genera were tabulated, or both existing and undescribed taxa, but as a rule, it is possible to refer genera to the tribes as she defined them.

### Gonopod structure

Relative to those in other juliform taxa, the male genitalia of parajulids are fairly complex. Although both pairs of appendages of the seventh segment are modified into gonopods, the posterior pair is typically involved in sperm transfer and most frequently and conspicuously modified at the level of genus and tribe. Despite their fundamental importance in classification, these appendages were poorly known prior to the publication by Mauriès (1972) of excellent drawings and descriptions of the type material of *Parajulus olmecus*, type species of its genus and family. A lengthy verbal account provided by Causey (1974) was supported by only two schematic drawings of limited utility. There is still no treatment of functional anatomy, although some of the intrinsic gonopodal muscles are shown on the drawings in the present paper.

Diplopodologists now generally agree that the gonopods of male Diplopoda have evolved through progressive modification of the legs of the seventh body segment. In some orders such as Platydesmida and Polyzoniida transformation has been limited to reduction in size, and the original podomeres are still distinct. In the order Polydesmida, at least a coxa-telopodite dichotomy is maintained, and several podomere homologs can be distinguished by position, appearance, and/or musculature. In some other orders (Spirostreptida and Chordeumatida) it is often difficult to establish homologies between parts of the complex gonopods and the presumptive generalized condition, although some clues may be detected in the gonopod primordia of immature stadia.

It follows therefore that the least modified (=plesiomorphic) state of male genitalia is that which retains the greatest extent of original structure, namely, sternum and six-segmented legs. The gonopods of parajulids qualify as generalized in the following respects:

1. Two pairs of modified limbs are maintained (as opposed to an apomorphic reduction or loss of one pair);
2. Well-developed, transverse sterna are present, with distinct tracheosternal apodemes utilized for muscle attachment;
3. Recognizable coxal element and articulated telopodite component(s) are present.

In the interest of developing a frame of reference for discussion of the genitalic structure of male parajulids in a comparative sense, I provide a provisional classification of the major elements useful in the systematics of aniulines, and which in many cases are present throughout the family. The lowercase, boldface letters identifying each structural unit are the same as those appearing on the illustrations, so that reference to this classification obviates the need for lengthy figure captions.

A. Anterior gonopods (distinguished by Causey as "peltogonopods")

1. Sternal components

a. Sternum, corresponding to the prosternum of the normal segment but slightly reduced in size; stigmata visible near lateral edges.

b. Tracheal apodemes, functioning primarily for muscle attachment.

2. Appendicular components. In most parajulids, the two coxal elements are strongly modified and tend to be coalesced medially into a syncoxa.

c. Lateral edge of coxal unit, forming the attachment point for the anterior sternal arm of the posterior onopods as well as the pivot that rests upon the onopodal condyle of the seventh pleurotergum.

d. Anterior paramedian syncoxal lobes, to which the sternum is closely attached.

e. Posterior paramedian syncoxal lobes (cf. Fig. 11), appearing to function in stabilizing the posterior gonopods when they are retracted.

f. Lateral syncoxal process. Although varying widely in size and shape in the family, this structure tends to be fairly stable at the generic level. In *Georgiulus* it is acuminate and curved anteroventrad over apices of the telopodites of the anterior gonopods.

g. Telopodite, more or less articulated at region "c," usually short, distally clavate and setose. Form relatively constant throughout the family.

B. Posterior gonopods

1. Sternal components

h. In the more generalized species of parajulids, a distinct



sclerotized transverse sternum ("h") is retained. It is extended anterolaterally to attach by intersegmental membrane to the anterior syncoxae at region "c," and this prolongation ("h'") occurs in all parajulids, even those in which the median sternal element has been lost.

i. Tracheocoxa. The size and shape of this element varies greatly, with maximum extent achieved in genera that have suppressed the normal posterior sternum and evolved much greater mobility to the posterior gonopods.

2. Appendicular components

j. Retractor muscle of telopodite. This intrinsic muscle originates on the inner side of "i" and inserts on apodeme "n" from the base of the telopodite. Its action is to pull the entire telopodite into a retracted position (i.e., dorsad) against the syncoxa.

k. Levator muscle of telopodite. This intrinsic muscle originates on a posterior projection of "i" and inserts on the base of the telopodite; its action opposes that of "j" and elevates the gonopod away from the anterior syncoxa.

m. The most consolidated part of the tracheocoxal aggregate, "m" serves as the condyle or fulcrum upon which the telopodite pivots; it represents the last remnant of the otherwise suppressed coxal element.

n. An elongate projection from the mesial side of the telopodite base, serving as the point of insertion for muscle "j"; its length provides extra leverage for the muscle, which is notably larger than its antagonist.

o. A projection from the outer side of the telopodite base, providing attachment for a part of muscle "k" and its lateral extension, the latter presumably contributing stability against contraction by the inner muscles.

p. Telopodite. An enlarged basal region, presumably prefemoral in homology, has a dense field of setae on the inner surface, the origin of the prostatic groove, and a prominent apodeme ("n") for muscle attachment. Distally the prefemoral region merges gradually into an elongate, thin, laminate, and subterminally expanded acropodite. The prostatic groove courses around to lateral surface of the telopodite and proceeds in a very slightly sinuous course to its apex (Figs. 9, 11).

- q. Prefemoral process of posterior gonopod, originating on the lateral side of the prefemur, in the form of a nearly straight narrow blade as long as the telopodite, to which it is essentially parallel (Fig. 10).
- r. Prefemoral region of posterior telopodite, typically with a prominent field of long setae and the origin of the prostatic groove (cf. Fig. 10).
- s. Basal prefemoral orifice of the prostatic duct.

The reader is reminded that gonopods are conventionally drawn in a reversed orientation with the true ventral side uppermost, although verbal descriptions allude to the actual anatomical position of parts and directions as dorsal and ventral.

As a concluding observation, I note that Dr. Causey proposed the term "disjunct" for the condition wherein the sternum of the posterior gonopods was missing and these gonopods were therefore completely separate from each other. The condition whereby both gonopods articulate with a well-developed transverse sternum was designated as "nondisjunct." Since this word is grammatically an objectionable double negative, it may be replaced with the cognate adjective form "conjunct" if such a descriptor is deemed useful.

#### Tribe *Aniulini* Causey

Diagnosis: Median sternal element of posterior gonopods missing, coxae of these appendages completely separate and unarticulated. No accessory gland or duct. Prostatic groove present, without fibrils.

Distribution: Ten nominal genera are recognized, widely distributed in North America east of the Sierra Nevada. The greatest generic diversity occurs in the Gulf Coastal Plain and Mississippian embayment region.

Remarks: This taxon was proposed by Causey (1974) to accommodate seven genera, but these were not specified aside from the implicit inclusion of *Aniulus*. A tribal diagnosis was provided, however: "Peltogonopods are usually erect and leaflike. Gonopods are elongated, heavily sclerotized, composed of a telopodite and a coxite; sternum is divided. Vulval apparatus is large, thickened, sclerotized; telopodites of second legs are minute. 48-61 segments." The following generic names have been based upon species which conform to the foregoing,



but it is not known which were regarded as valid or synonymous by Dr. Causey: *Aliulus* Causey, 1950, *Aniulus* Chamberlin, 1940, *Ethoiulus* Chamberlin, 1918, *Gyniulus* Loomis, 1963, *Hakiulus* Chamberlin, 1940, *Illiulus* Causey, 1950, *Okliulus* Causey, 1950, *Oriulus* Chamberlin, 1940, and *Pseudojulus* Bollman, 1887. The male genitalia of all these nominal taxa are basically similar in form, with group differences manifested chiefly in relative size and shape of elements of the posterior gonopod telopodite. Some of these genera appear to be fairly diverse in telopodite form, but since others are monotypic it is not certain what rank should be assigned to what level of differentiation. Until the entire group has been revised, I prefer to avoid premature value judgments and accept the existing names without prejudice. Future studies may show that each so-called genus is better treated as a polytypic species, the more so since most of the species appear to be allopatric.

Other character systems in addition to the gonopods must also be accounted, however, at least in some cases. The remarkable hypertrophy of the male eighth sternum in both *Pseudojulus* and *Georgiulus* sets these taxa apart from other aniulines, while correlated similarities in the genitalia of both sexes identify the sternal character as a synapomorphy.

The various nominal genus-group taxa referred to above may be distinguished by the following contrasted statements:

1. Sternum of seventh segment of males strongly modified: projecting ventrad as two large paramedian lobes in front of the legs and dorsad as a lingulate median process extending to or beyond center of body cavity (Figures 7, 20) . . . . . 2
- Sternum of seventh segment of males at most enlarged, deltoid, projecting anteriad but not dorsad into body cavity, nor lobed in front of the legs . . . . . (all other genera of Aniulini)
2. Telopodite of posterior gonopod longer than prefemoral process, its distal third retrorsely and sigmoidally flexed (Figure 19); coxal elements of female genitalia not prolonged distad beyond synoperculum (Figure 21) . . . . . ***Pseudojulus***

Telopodite of posterior gonopod shorter, about equal to prefemoral process and nearly straight, without reflected distal region (Figure 10); coxal elements of female genitalia projecting distally beyond synoperculum for a distance equal to length of the valves (Figure 5) . . . . . **Georgiulus**

### **Georgiulus, new genus**

Diagnosis: A genus of Aniulini in which the median sternal projection of the seventh segment is hypertrophied, extending more than half the body height into the coelom (Figure 7); coxae of posterior gonopods almost completely reduced, represented only by a condylar structure (Figure 10, "m") upon which the telopodite pivots; latter elongated and blade-like, with complete prostatic groove and long, slender prefemoral process (Figures 9, 10, "q"). Coxal elements of female genitalia fused, prolonged distad beyond level of segmental pleurae (Figure 5).

Type species: *Georgiulus paynei*, new species.

Name: A neologism combining the place name Georgia with the suffix "-iulus," observing the precedent of naming parajulid genera for the states in which they occur (e.g., *Caliulus*, *Okliulus*, *Illiulus*).

Distribution: Known from the Piedmont and Coastal Plain of Georgia (Figure 22), but surely occurring in South Carolina, Florida, and Alabama as well.

### **Georgiulus paynei, new species** (Figures 1-11)

Material: Male holotype, two male and one female topoparatypes from Tifton, Tift County, Georgia, 27 January 1968, J. A. Payne leg. 19 additional male and female topoparatypes are dated October 12, October 29, November 18-24, 1967, and January 13, 1968, same collector (all VMNH).

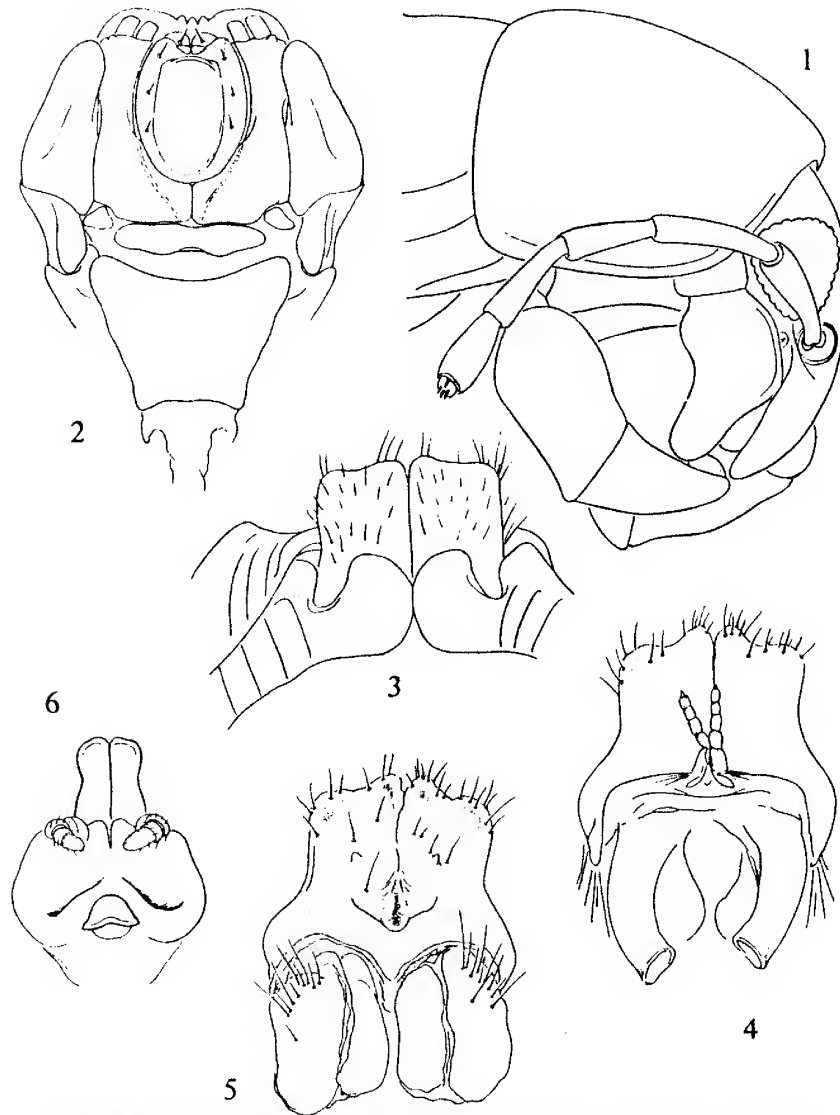
Holotype: Adult male, ca. 32 mm long (broken and curled pieces), 2.3 mm in maximum diameter, body with 53 segments. Color modified by long preservation in alcohol, at present with legs and lower sides of segments testaceous yellow, dorsum a nondescript light purplish-brown, each metazonum notably darker middorsally, between level of

ozopores, but each dark area divided by a narrow transverse light band continuous with color of lower sides; caudal fourth of metazona semitransparent orange-testaceous; epiproct and collum uniform light brown except for darker anterior margin of collum; head brown with a darker interocular band, lower half of face almost white; antennae and mandibles light brown.

Head smooth and nearly glabrous, 1-1 interocular setae placed just dorsad to the distinct transverse suture, 10-10 labral setae, progressively larger medially, and 1-1 clypeal setae placed just dorsad to the labral notch. Interocular and interantennal widths about equal. Ocelli in 10 rows in a subtriangular cluster, 11-9-8-7-7-6-5-4-3-1 = 61. Antennae long and slender, articles in decreasing length order: 2-3-4-5-6-1-7, basal antennomere largely retracted into the socket. No sensory areas or pits noted. Mandibular stipe prolonged ventrad to level of labral margin (Fig. 1). Gnathochilarium of form typical for the family, but promontum much larger than usual, ovoid, with three setae on each side, anterior median margin strongly produced into a subdeltoid projection nearly perpendicular to adjacent surfaces; shape and arrangement of individual sclerites as shown in Figure 2.

First pair of legs of typical parajulid form, coxosternum medially suturate, basal three podomeres small, much broader than long, fourth largest, flattened, with about 45 dark hemispherical granules dispersed over its median surface, fifth much narrower and subcylindrical, with about 17 granules; claw large, flattened-concave, broadly oval in shape.

Second pair of legs (Fig. 6) reduced in size, sternum forming distinct arch over penis on aboral side, coxa strongly produced distad into two contiguous digitiform lobes; telopodite with three podomeres, no terminal claw present. Body segments essentially smooth, very slightly constricted at midlength, segmental stricture represented by fine but distinct ridge, anterior half of prozona with 4-6 very fine concentric striae which ventrolaterally curve posteriad to merge with longitudinal striations of lower metazona, latter distinct almost up to level of ozopores. Sterna smooth, without transverse striations. Legs slender, unmodified, generally setose, tarsi with usually four macrosetae along ventral side. Epiproct prolonged into long, nearly straight, slightly decurved spine with two setae on each side; paraprocts evenly convex, smooth, distal edges scarcely marginate; hypoproct broadly subtriangular with indistinct median apex and two closely set paramedian subapical setae.



Figures 1-6. *Georgiulus paynei*, n. sp. 1) head and collum of male, lateral aspect; 2) gnathochilarium of male, in situ between mandibles, dotted line indicates course of presumed salivary ducts; 3) epigynal region of second and third segments of female, posterior aspect showing extension of syncoxa in normal position; 4) cyphopods of female paratype, anterior aspect showing prolonged syncoxa, reduced legs, and oviducts; 5) cyphopods, posterior aspect; 6) second pair of legs of male, posterior aspect, reduced legs and penes seen in distal aspect.

Eighth segment (Fig. 7) with sternum greatly incrassate, ventrally bilobed in front of legs, prolonged dorsal into body cavity for about half its diameter, with high, prominent median keel on anterior side.

Gonopods as described under generic heading and shown in Figures 8–11, pivoted against condyles on lower inner face of seventh pleurotergum by cavity on lateral side of coxal region "c" (Fig. 8); sternum of anterior gonopods reduced to small transversely oval sclerite "a"; coxae enlarged and strongly modified, medially fused, produced into two continuous anterior processes "d" and two posterior lobes "e," laterad of which are the slender, elongated, falcate coxal endite processes "f." Posterior gonopods completely separate ("disjunct"), the median sternal elements lost or fused with reduced coxal remnants (Fig. 11); telopodites ("p") of basic aniu-line structure, long, slender, laminate, unbranched, apically broadened, with slender prefemoral process ("q").

Paratype: Female, length ca. 32 mm, diameter 3.0 mm, body with 52 segments. Details of structure and coloration agreeing closely with those of male. Female genitalia as shown in Figures 3–5: pleurotergal lobes of fourth segment rounded, contiguous, much exceeded by syncoxal prolongation of cyphopods, telopodite retained as minute, 5-segmented appendages with rudimentary distal claw (Fig. 4). Valves unequal in size, the outer larger and with a field of setae apically.

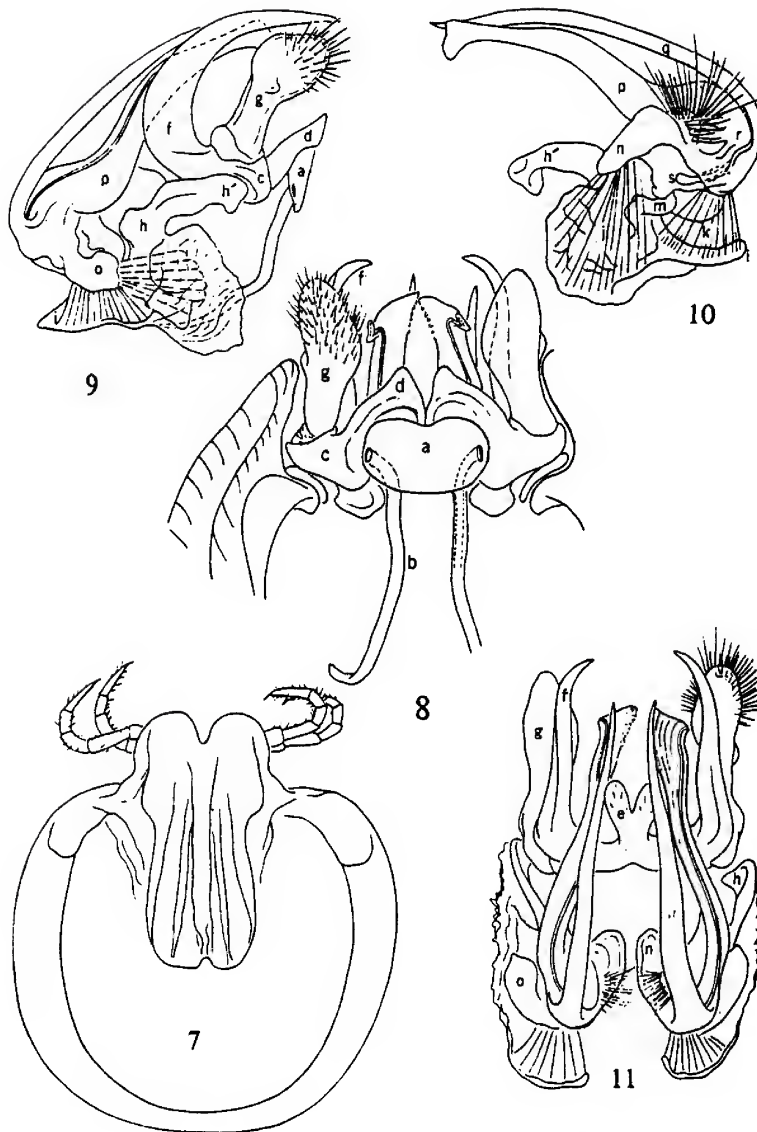
Distribution: Southcentral coastal plain of Georgia (Fig. 22). In addition to the type locality, the species is known from two samples, one from the Bar M Ranch near Boston, Thomas County, April 1968, W. Sedgwick (1 male), the other from two miles east of Perry, Houston County, 1 February 1976, J. A. Payne (1 male, 1 female), both VMNH. *Georgiulus paynei* will almost certainly be discovered in northern Florida as well.

Remarks: This is the "undescribed genus and species" reported to be carnivorous by Hoffman & Payne (1969), and as such is a member of the very small group of millipeds known to practice this unusual kind of nutrition.

Immatures of both sexes, in the penultimate stadium, are represented along with adults in samples taken at Tifton from early October to late January.

Name: A patronym honoring Jerry A. Payne, collector of the species and many other interesting Georgian millipeds.





Figures 7–11. *Georgiulus paynei*, n. sp. 7) eighth segment of male paratype showing enlargement and modification of sternal region, anterior aspect; 8) gonopods shown in situ, attached to ventral ends of pleurotergum of seventh segment, anterior aspect with muscle and membrane removed; 9) left gonopods, lateral aspect, specimen cleared in trypsin, but one muscle indicated in original position; 10) left posterior gonopod, mesal aspect; 11) both pairs of gonopods, posteroventral aspect (coxal lobes "d" not shown). Abbreviations explained in text.



***Georgiulus hubrichti*, new species**  
(Figures 12–14)

Material: Male holotype, male and two female paratypes (VMNH) from roadside dump, four miles north of Evans, Columbia County, Georgia; Leslie Hubricht, leg., 24 October 1954.

Holotype: Length indeterminable, diameter 3.2 mm; body with 56 segments. Agreeing closely in peripheral features with *G. paynei*, differing in genitalic features (Figs. 12, 13) as follows: sternum of anterior gonopods (a) with deep U-shaped median diastema; anterior paramedian ventral lobes of syncoxite (c) broadly rounded instead of acute; setose apical lobe of telopodite (g) prolonged anteriad instead of evenly rounded; lateral process of coxa (f) broad and deeply excavate on its anterior side; telopodite of posterior gonopod (p) without prominent basal lobe and much less sinuously flexed than in *paynei* (Fig. 9).

Paratype: Female with 56 segments, body diameter 2.9 mm. Genitalia (Fig. 14): coxal elements less prolonged than in *paynei*; posterior side of synoperculum with subtrapezoid median structure.

Distribution: Known only from the type locality, but certainly to be expected elsewhere in the Piedmont of both Georgia and South Carolina.

Name: The species is named for its collector, premier authority on land snails of eastern North America and discoverer of numerous new taxa of Diplopoda.

***Pseudojulus* Bollman, 1887**

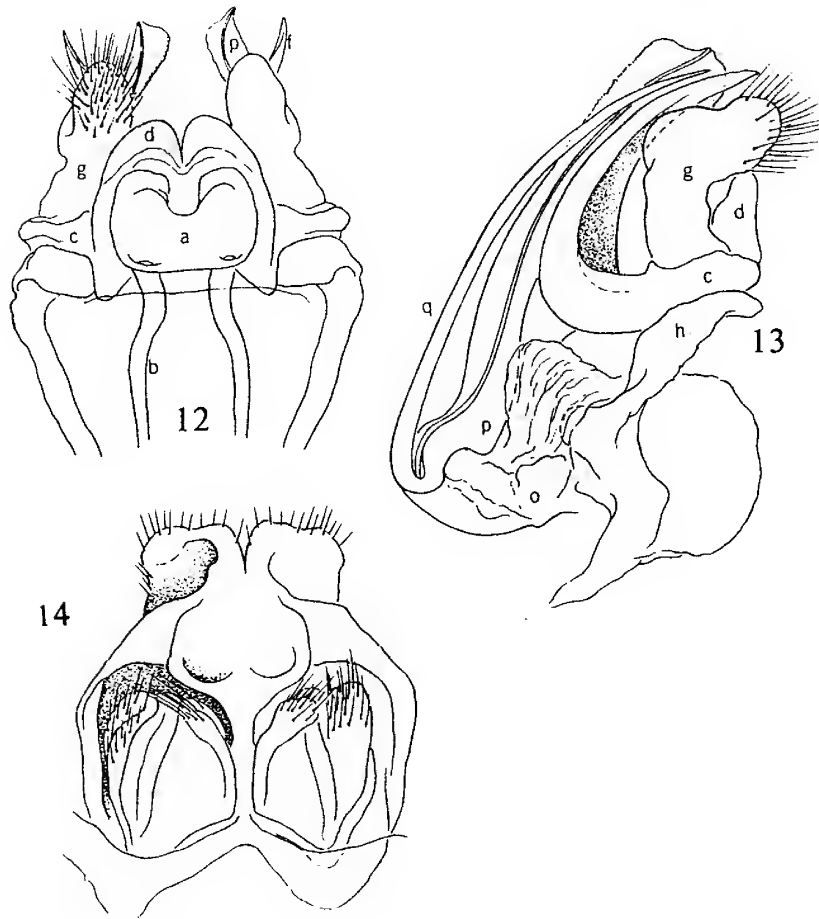
*Pseudojulus* Bollman, 1887, Ent. amer., vol. 2, p. 227. Proposed as a subgenus of *Parajulus*, with two new species. Type species: *Parajulus* (*Pseudojulus*) *obtectus* Bollman, by subsequent designation of Bollman, 1887, Ann. New York Acad. Sci. vol. 4, p. 38.

*Pseudoiulus* [sic] Cook, 1895, Ann. New York Acad. Sci., vol. 9, p. 6 (invalid emendation?, lapsus calami?)

*Pseudojulus*: Chamberlin & Hoffman, 1958, Bull. U. S. Nat. Mus., no. 212, p. 141.—Hoffman, 1980, Classification of the Diplopoda, p. 108.

Diagnosis: A genus of Aniulini in which the sternum of the eighth

segment is prominently enlarged and extended dorsally into the body cavity (Fig. 20), and the telopodite of the posterior gonopod is apically prolonged and sigmoidally reflexed (Fig. 19).



Figures 12–14. *Geogiulus hubrichti*, n. sp. 12) anterior gonopods of paratype, anterior aspect; 13) left gonopods, lateral aspect, muscles removed by trypsin; 14) cyphopods of female paratype, posterior aspect showing characteristic median structure. Abbreviations explained in text.

Name: Greek *pseudos*, false + *-julus*, presumably bestowed because of the condition of the genitalia, which Bollman did not recognize as simply immature.

Distribution: Western Florida (Fig. 22).

Species: Only the type species is presently known.

***Pseudojulus obtectus* (Bollman)**

(Figures 15–21)

*Parajulus* (*Pseudojulus*) *obtectus* Bollman, 1887, Entom. amer., vol. 2, p. 227.—1887, Ann. New York Acad. Sci., v. 4, p. 37.

*Pseudojulus obtectus*: Chamberlin & Hoffman, 1958, Bull. U. S. Natl. Mus., no. 212, p. 141.

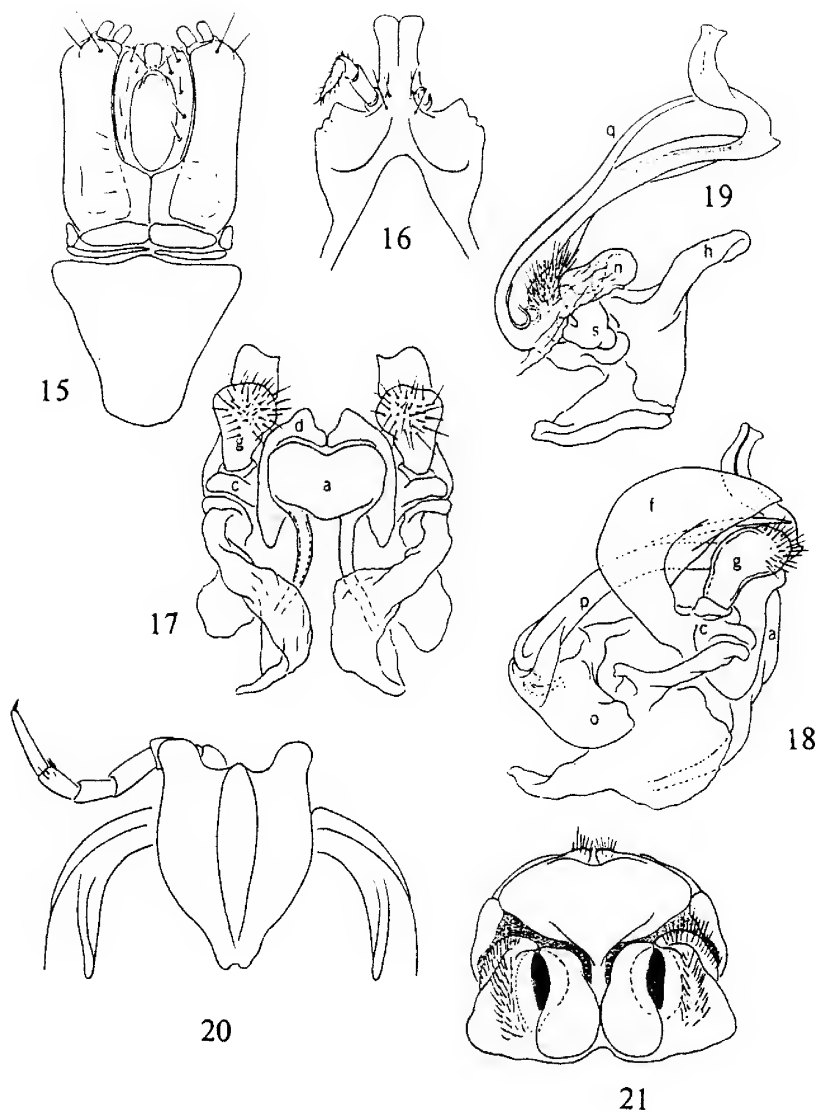
Type specimens: Immature male and female syntypes, formerly in the U. S. Nat. Mus., but not seen in recent years and presumed to be lost or misplaced.

Type locality: "Bloomington (Indiana) and Florida" (Bollman, 1887a), and "Bloomington, Indiana, and Pensacola, Florida" (Bollman, 1887b). Restricted by Chamberlin & Hoffman to Pensacola, Escambia County, Florida, although no lectotype designation was made.

Material: Males and females (FSCA) labeled "Florida: Santa Rosa Co., Boy Scout Camp, 3. X. 1958, N. B. Causey," identified as *obtectus* by the collector.

Diagnosis: With the characters of the genus; specific characters will be identified in configuration of the genitalia structures when additional species are known.

Description (male from Santa Rosa County, Florida): Length about 30 mm (rigidly curled), diameter 2.3 mm. Body with 54 segments. Original coloration lost through preservation, at present animal largely testaceous ventrally, legs pale yellowish basally, becoming slightly darker distad; antennae light grayish brown; last segment and paraprocts uniformly dark brown. Each segment with posteriormost sixth a clear golden brown, remainder of surface dorsally purplish, fading anteriad, a nearly complete dark ring on posterior fifth, preceded by a white band; anterior half of dorsal surface with a transverse white band interrupted by a dark median longitudinal stripe; laterally this light band is enlarged to form an oval spot which on most posterior segments is broken into two or more smaller white spots.



Figures 15–21. *Pseudojulus obtectus* (Bollman). 15) gnathochilarium of male; 16) second pair of legs of male, posterior aspect; 17) anterior gonopods, anterior aspect, specimen cleared in trypsin to show extent of posterior tracheal apodemes; 18) left gonopods, lateral aspect; 19) left posterior gonopod, mesal aspect showing strongly reflexed apex of telopodite; 20) sternum of eighth segment of male, anterior aspect; 21) cyphopods, posterior aspect. Abbreviations explained in text.

Details of body structure very similar to those described for *Georgiulus paynei*, except gnathochilarium narrower, with median convexity of lingual lamellae smaller, and median commissure of stipes distinctly longer (cf. Figs. 2 and 15). Form of second pair of legs, Fig. 16.

Male genitalia (Figs. 17–19) generally similar to those of *Georgiulus* but telopodite of posterior pair much longer and sigmoidally reflexed (Fig. 19). Sternal structure of eighth segment bilobed, but with broad median diastema and very prominent ridge on anterior face (cf. Figs. 7 and 20).

Female (Santa Rosa County, Florida): Slightly larger than male, body diameter 2.5 mm, with 54 segments. Structure and coloration essentially as described for male.

Cyphopods (Fig. 21) with distinct peltate, transversely oval "gynaspis" on posterior side and not prolonged distally as in *Georgiulus* (Cf. Figs. 5 and 21), valves dissimilar in shape, short and basally transverse.

Distribution: This species is known to me only from extreme western Florida (Escambia and Santa Rosa counties), but surely must occur in southern Alabama as well.

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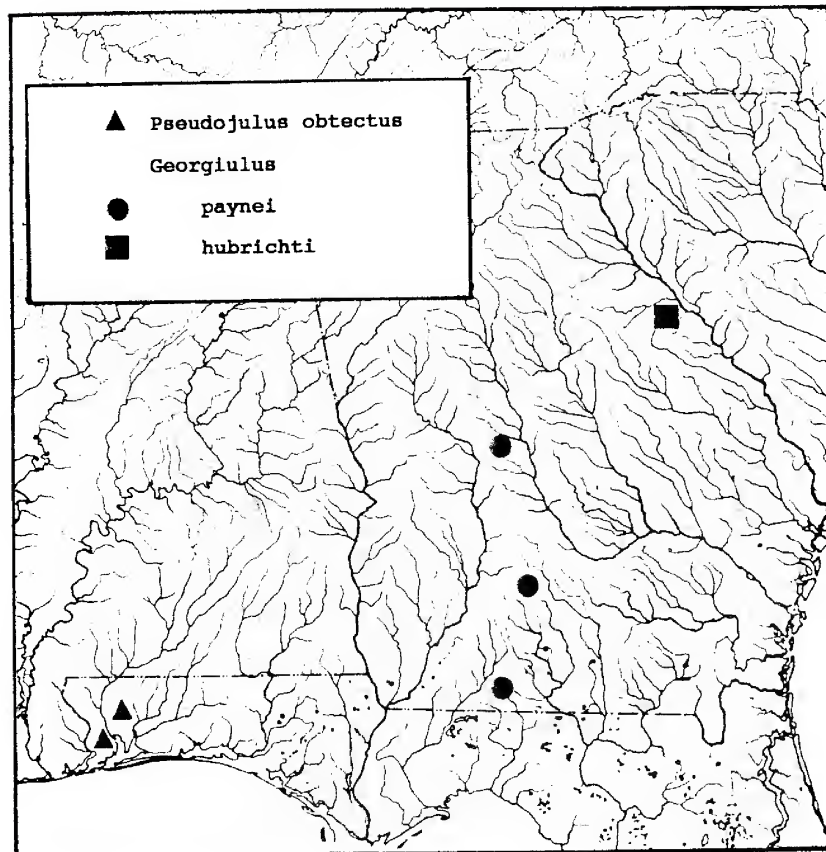


Figure 22. Distribution of the species of *Pseudojulus* and *Georgiulus* in Georgia and western Florida.